A TAXONOMIC EVALUATION OF *ELYMUS SIMPLEX* (POACEAE)

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Abstract.— An investigation was made of *Elymus simplex* to evaluate the current taxonomy and cytology. The study included herbarium specimens from Wyoming and Colorado and population samples from the type location in Wyoming. The most important taxonomic characters noted are: numbers of spikelets per node, lemma awn length, and habitat. The chromosome number of *E. simplex* is reported as $2n=28$. *E. simplex* is a distinct species and should not be confused with *E. salina*, from which it differs morphologically.

The grass *Elymus simplex* Scrib. and Williams (1898) is a little-known species of Wyoming and Colorado. The type collection is from the Green River area of southwestern Wyoming.

The taxonomic concept of this species was confused by its description in Hitchcock's Manual (1935), which in the present interpretation, appears to have been based on specimens of both *E. simplex* and *E. salina* Jones. The original description by Scribner and Williams (1898) and those of Hitchcock (1935) and Chase (1951) do not refer to the same species. The long-term result has been many incorrectly identified specimens.

Hitchcock (1934, 1935) did not recognize *E. simplex* as a distinct species from *E. triticoides* Buckl. and formally treated it as *E. triticoides* Buckl. var. *simplex* (Scribn. and Williams) Hitchcock. In his revision, Chase (1951) reinstated *E. simplex* as a species keying out next to *E. triticoides* and *E. pacificus* Gould, on the basis of awn length.

The present investigation is concerned with the taxonomic status of *E. simplex*, with special consideration of the morphological and cytological characteristics of seven populations occurring along a 20-mile section of the Green River in Sweetwater County, Wyoming. The cytological materials were fixed in Newcomer's Solution (Newcomer 1953). After 24 hours the materials were removed and stored in 70 percent alcohol. Pollen mother cells were prepared for observation using a standard acetocarmine smear technique.

Cytology.— The chromosome record of $2n=28$ (Fig. 1) is the first for the species. One chromosome association, that of 14 bivalents, was found in the 213 pollen mother cells interpreted. Meiotic pairing was excellent with a few irregularities. The pollen grain stainability was 96 percent when stained with potassium-iodide solution, indicating a high degree of pollen fertility.

Morphology and taxonomy.— The following description of *E. simplex* was made using 122 specimens of this species. The measurements were taken from specimens from seven populations and borrowed herbarium specimens.

Elymus simplex is an erect perennial grass, 2-5 dm in height, from strong creeping rhizomes; culms with stiff, flat pungently pointed leaves, culms branched at the base growing in scattered tufts; lower

Fig. 1. Meiotic chromosomes of *E. simplex* PMC at metaphase 1, showing a cell with 14 bivalents, $2n=28$, (ca 1600 x).

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sheaths crowded, glabrous, exceeding the internodes; ligule 0.5 mm long; auricles small, weakly clasping; leaf blades 5-20 cm long, 3-5 mm wide, often inrolled, lower surface smooth, upper surface scabrous; inflorescence a spike, 5-11 cm in length, axis scabrous and strongly flattened; spikelets 1.5 cm in length, usually paired, sessile to shortly pedicellate, crowded, 5-7 flowered; glumes 5-8 mm long, rigid, subulate, asymmetrical, slightly unequal, glabrous and rounded on the back; lemmas 5-8 mm long, glabrous rounded back, ciliate hyaline margin, extending into a rigid awn 3-14 mm long; paleas 5-7 mm long, deeply sulcate toward the base, bifid apex, scabrous on back; anthers 3.5 mm, with a short filament; caryopsis 5 mm long, sparsely produced; cross pollinating. Chromosome number $2n=28$.

E. simplex is distributed throughout southern Wyoming and sparingly in central Colorado on the riverbanks. The center of distribution appears to be in Sweetwater County, Wyoming, along the banks of the Green River north of Green River, Wyoming.

This species requires a high amount of sunlight, an open habitat, and alkaline or sandy soil. It occurs in open sites and possesses many long rhizomes that could serve as an excellent soil binder for exposed road cuts.

Type specimen: *Williams 2334* not examined.

Isotype: *Williams 2366* was examined.

Representative specimens:

COLORADO: El Paso Co. *Silveus 1997* (TAES), Lake Co. *Gooding 3964* (US). Summit Co. *Shear 1064* (US). WYOMING: Albany Co. *Williams 2243* (US). *Williams 2261* (US). *Nelson 261* (US), Crook Co. *Williams 2589* (US), Laramie Co. *Nelson 3335* (US). Sweetwater Co. *Williams 2332* (US). *Merrill 36* (US). *Merrill 74* (US). *Nelson 3892* (US). *Hatch 604* (TAES). *Hatch 607* (TAES). *Rydberg 2042* (US). *Nelson 4451* (US). *Merrill 36* (RH). *Vosler 165* (RH). and *Smith 1809* (RH).

Considerable confusion has resulted from Hitchcock's (1935) statements that *E. simplex* has rhizomes and only one spikelet per node and that *E. salina* has one spikelet per node and lacks rhizomes. The isotype of *E. simplex* (*Williams 2366*, US) has inflorescence nodes with one or two spikelets per node and rhizomes. Examination of the holotype of *E. salina* (*Jones 5447*, US) shows that this species has short rhizomes and typically one spikelet per node. When *E. salina* is pulled from the ground, the weak short rhizomes often are lost and the resulting specimen is without rhizomes. Such specimens of *E. salina* were thought to be typical, and carefully collected specimens were referred to *E. simplex*.

Plants of *E. simplex* differ from *E. salina*, *E. triticoides*, and *E. pacificus* in lemma awn length, plant height, typical number of spikelets per node, rhizome length, habitat, and chromosome number (Table 1). Typically, the lemmas of *E. simplex* have awns 6 mm long. In contrast, *E. salina*, *E. triticoides*, and *E. pacificus* have lemmaes that are usually awnless or with very short awns.

In conclusion, *E. simplex* is different from *E. salina*, *E. triticoides* and *E. pacificus* in a number of morphological and cytological characteristics. Therefore this taxon should be retained as a separate, distinct species.

Table 1. Comparison of Important Characteristics of *E. simplex*, *E. salina*, *E. triticoides*, and *E. pacificus*.

	E. simplex	*E. salina*	*E. triticoides*	*E. pacificus*
Plant height	20-50 cm	30-80	60-100	10-20
Lemma awn length	3-14 mm	0-2	0-2	0-1
Typical number of spikelets per node	2 & 1	1	2	1
Rhizome length	20-300 cm	2-15	20-70	20-70
Habitat	Sandy riverbank and alkaline flats	Rocky slopes & hillsides	Alkaline flats	Sandy coast
Chromosome number	$2n=28$	$2n=56$ (Jensen 1971)	$2n=28$ (Gould 1945)	$2n=42$ (Gould 1945)

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